







## 2.6 Design

### 2.6.1 Modular Design

The inverter construction shall use a modular technique so that sizes shall be available in increments from 1.0 to 12.5 kVA capacities. Modules shall be interconnected to build the required system capacity and shall be field-upgradable to increase system size. Inverter modules shall be high frequency Pulse Width Modulated (PWM) using isolation transformers and IGBT or MOSFET switching schemes which allow for high quality pure sine wave and multi-voltage capabilities.

### 2.6.2 Convection Cooling

Thermal design performance shall achieve 100% reliance on natural convection during the standby or “Normal Operation” mode (99.9% of product life). Fans shall only be operational during “Emergency Operation” mode and bulk re-charging of the batteries. This increases efficiency, improves reliability, and eliminates the need for air filters and routine dust-removal maintenance commonly found with units employing continuous operation fans.

### 2.6.3 Front Access

All inverters shall utilize a front-facing access door on both the inverter cabinet and battery cabinet. The batteries utilized in these units have front facing terminals. This design allows for easy access for troubleshooting and battery installation from the front face with no side access required.

### 2.6.4 DC Isolation from AC

Batteries shall have isolation from the incoming or outgoing AC line voltage and Earth Ground. This feature allows a direct short between any battery-to-chassis ground without damage. Minimum impedance to chassis ground shall be 100 kOhms.

### 2.6.5 Short Circuit Withstand Capability

The Inverter’s internal AC distribution shall be capable of a short circuit withstand of 65,000 Ampere Interrupting Capacity (65 KAIC). The inverter shall be tested and listed in compliance with the IEC testing standards UL 61800-5-1 and shall also include this rating when using optional output circuit breakers which are UL 489 rated.

### 2.6.6 Inverter Compliance

The inverter shall be tested and listed by Underwriters Laboratory to the UL 924 standard which also includes the Self-testing and Self-Diagnostic portion of the standard. Self-Testing shall be performed monthly for a minimum of 30 seconds and annually for a minimum of 90 minutes to comply and also contain fully programmable, password protected Load-Reduction fault programming capabilities.

## 2.7 User Interface/Alarms

The inverter shall include an intuitive four-line, 20 character LED-backlit display and five button keypad user interface referred to as the Man-Machine Interface (MMI). This interface shall allow the user to scroll through all meters, alarms, test logs and programming functions via the keypad and display. An SD Memory Slot and Mini-USB connection shall also allow for easy offloading of events/records.

### 2.7.1 MMI Features

The following features are standard on all modular inverters.

- A. Password Protected All user configurable system features exist in a Password Protected menu within the unit.
- B. One-Button System Test UL 924 compliance is easily achievable by the press of one button on the front panel of the inverter. A 30 second test will initiate self-testing and self-diagnostics by analyzing battery voltages and output loads.
- C. Scheduled Testing The inverter can be programmed to automatically perform monthly and annual 90 minute NFPA compliance tests. User can specify minute, hour, day and month.

### 2.7.2 Metering Functions

The MMI shall allow the user to monitor the following meter functions via the LCD screen:

- A. Input Voltage (L-N)
- B. Output Voltage (L-N)
- C. Output Current
- D. Output VA
- E. Battery Voltage
- F. Battery Current
- G. Battery Power
- H. Temperature
- I. System Days
- J. Inverter Minutes
- K. Inverter Events.

### 2.7.3 Alarms

The active alarms shall be displayed in the Alarm Menu when alarms are present. All alarms shall signal the user with both an Audible Alarm and a Visual Alarm LED on the unit's front panel.

- |                              |   |
|------------------------------|---|
| A. Startup Mode Alarms       | Communication, Setup Conflict, Battery Voltage, Back-Feed, Transfer /AC Fuse, Overload, Mis-Wire, Incorrect AC<br>(Fixed Alarms, Not Configurable)  |
| B. Charger Mode Alarms       | Communication, Over-Temperature, DC Fuse, No Charge, Overcharge, Back-Feed, AC Fuse/Wiring, Program Reference<br>(Fixed Alarms, Not Configurable)   |
| C. Inverter Mode Alarms      | Communication, Over-Temperature, Overload, Crest Factor, V-Out, Back-Feed, Low Battery, Program Reference<br>(Fixed Alarms, Not Configurable)   |
| D. Non-Mode Dependent Alarms | Phase Rotation (unavailable on single-phase), CB Trip (requires Trip Alarm [TA] option), UPS Bypass (requires Maintenance Bypass [MB] option), Overload, Overload Shutdown.<br>(Fixed Alarms, Not Configurable) |
| E. User Programmable Alarms  | Low Battery, Near Low Battery, High Temperature, Utility Failure, Low VAC, High VAC, Load Reduction.<br>(Password Protected, Configurable)  |

#### 2.7.4 Onboard Event/Test/Alarm Logging

Event Logs, Test Logs and Alarm Logs shall be stored on board the inverter's MMI. The system shall store up to 1000 of each type in a First in – First out process. All data can be downloaded via local SD, local USB, and the LifeGuard Remote Web Monitoring.

- |              |   |
|--------------|---|
| A. Event Log | During an Event, the system shall keep a record of each critical parameter Including: Start/End Time, Date of the event, Start/End Output Voltage, Start/End Output Current, Start/End Output VA, Start/End Battery Voltage, Battery Current, Start/End Temperature   |
| B. Test Log  | Identical to the Event Log with the exception that the Test Log is only stored when a system test is either: <ol style="list-style-type: none"> <li>1. User Initiated by pressing the Test Button on the front panel keypad or via the "Test Button" on the LifeGuard Remote Web Monitoring control panel<br/><i>OR</i></li> <li>2. When the system is instructed by the programmable automatic monthly or yearly test</li> </ol> |



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- C. Alarm Log In the event an alarm occurs from any of the sources detailed in Section 2.7.3, the alarm is immediately stored into memory.

### 2.7.5 User Setup Menu:

The password protected User Menu shall allow adjustments to the following parameters:

- A. Date (MM,DD,YY)
- B. Time (24hr)
- C. Month Test
- D. Year Test
- E. Low VAC Alarm
- F. High VAC Alarm
- G. Near Low Battery Alarm
- H. Utility Failure Alarm
- I. High Temperature Alarm
- J. Time Delay
- K. Load Reduction Alarm
- L. Alarm Relay(s)
- M. Backup Logs
- N. Contact Name
- O. Contact Phone Number

## 2.8 Remote Web Monitoring (24/7/365)

The LifeGuard Remote Web Monitoring shall be a standard feature on the inverters. This user-friendly feature shall ensure code compliance 24hrs a day/365 days a year by providing real-time monitoring and logging of all essential tests and data within the system. All user adjustable settings available on the MMI shall be available via LifeGuard Remote Web Monitoring (refer to Sections 2.7.1 through 2.7.5).

### 2.8.1 Email

The Remote Web Monitoring shall notify users via email when email alerts and alarms are configured. Up to 5 Email addresses can be setup as alert/alarm recipients.

### 2.8.2 Access Anywhere

The Remote Web Monitoring shall allow users to log on, view, interact, and download records as needed anywhere, anytime, from any computer, tablet, or mobile device.

### 2.8.3 Remote Diagnostics

The Remote Web Monitoring diagnostics and troubleshooting allow for quick response and diagnosis, potentially alleviating the need for on-site field service.



## 2.9 Quality Assurance

### 2.9.1 Manufacturer Testing

All inverters shall be manufactured in Trevoese, PA. End-of-line quality tests shall be performed by the build team. Each unit produced shall be 100% load tested and run through a series of durability tests, fault tests and unit-specific option tests by the Quality Control Team. The inverter shall then be inspected a third time to ensure 100% specification compliance prior to shipping.

### 2.9.2 Self-Testing

Each inverter shall utilize several different methods of self-testing. On start-up, each unit shall test the following prior to entering Normal Operation Mode: Communications, Set-Up Conflict, Low Battery, Back-feed, Transfer/AC Fuse, Short/Overload, Miswire, and Incorrect AC Input. Scheduled Self-Tests can be programmed into the unit for Monthly tests and Yearly 90 minute NFPA compliance tests. In addition, each unit shall continuously test itself and notify users of issues via the Onboard Diagnostics and the LifeGuard Online Remote Monitoring.

## 2.10 Fabrication

### 2.10.1 Cabinet Construction

The inverter cabinets shall be made from 14 gauge cold-rolled steel. All corners and seams shall be welded and ground smooth before powder coating. Internally, each inverter module and shelf shall have galvanized or painted steel parts to resist corrosion and provide high durability. There is no visible hardware on the outside of the cabinet, with all components contained within the enclosure. Each cabinet design shall have multiple pre-punched Electrical Knock Outs (EKO) on the top and sides for quick and clean conduit installation by a qualified electrician. Seismic Certified Brackets shall be available as an option (see Section 7.0 "Options"). All Cabinets are designed for NEMA Type-1 compliance.

### 2.10.2 Cabinet Finish

Each inverter cabinet is powder coated with 2-tone TIGER Drylac®.

Cabinet: TIGER Drylac® Texture Matte Finish Powder Coat - 09/71420 RAL 7016 (GREY)

Door: TIGER Drylac® Texture Smooth Finish Powder Coat - 49/73510 RAL 7035 (LT GREY)

### 2.10.3 Manufacturing Method/Location

Each inverter shall be designed, developed, and manufactured in Trevoese, PA. Each unit shall be built to order and therefore fully custom. Each unit shall be 100% tested for an extended period of time before being released to be shipped.





### 3.0 Functionality

#### 3.1 Normal Operation (Pass-Through Mode)

When normal utility power is present, the inverter shall run in Pass-Through Mode. Utility Power will be the source of power for all circuits, simply passing through the inverter unit to supply those circuits. The inverter unit will consume a small amount of power to run internal monitoring circuits and provide float charging to the battery circuit.

#### 3.2 Emergency Operation (Discharging Mode)

When a loss of utility power occurs the inverter shall detect this and switch to Discharging Mode. The inverter shall transfer to supplying AC to the connected circuits in less than 2 mS. Once utility power is restored, the inverter shall switch back to using utility power to supply the connected circuits.

#### 3.3 Recharge Operation (Charging Mode)

The inverter shall revert to Charging Mode when utility power is returned to the unit. If batteries are fully depleted, they shall be fully recharged within 24 hours. The Three Rate Charger circuit is fully temperature-compensated for added reliability.

### 4.0 Environment

#### 4.1 Recommended Location:

The manufacturer recommends that all Inverter Cabinets reside in a dry, Conditioned space with Normal Ventilation. Relative Humidity shall be <95% non-condensing. All Cabinets are designed for NEMA Type-1 compliance.

#### 4.2 Operating Temperature:

Normal operating temperature is defined as between 68°F (20°C) to 86°F (30° C).

#### 4.3 Storage Temperature:

Storage before installation is critical for battery life expectancy and warranty. Batteries should be stored indoors in a clean, dry, and cool location. Storage at higher temperatures will result in accelerated rates of self-discharge and possible deterioration of battery performance and life. The recommended storage schedule based on temperature is as follows:

32°F (0°C) to 50°F (10°C)	9 Months
51°F (11°C) to 77°F (25°C)	6 Months
78°F (26°C) to 92°F (33°C)	3 Months

#### 4.4 Elevation:

No derating required up to 1,600 Meters (5,280 ft.)

Apply derating of 2% per 125M up to maximum of 2,500 Meters (8,250 ft.)

Consult factory for elevations greater than 2,500 Meters (8,250ft)



## 5.0 Installation

### 5.1 Factory Start-up (Onsite Commissioning)

Factory Start-up shall be an available option on all inverters (option FS, see section 7.10). Using the manufacturer's Field Service to start-up the unit will ensure proper installation, system longevity, and extend the standard electronics warranty from 2 years to 3 years. Factory Startup shall include, but is not limited to the following:

- A. Perform visual inspection of all input and output connections made by electrician
- B. Inspect all bolts and battery buss bars for proper torque specification
- C. Setup and configure all settings, alerts and alarms per specification
- D. Calibrate the inverter
- E. Run diagnostic tests and alert/alarm tests
- F. Record all current settings on inverter to set a baseline for future servicing
- G. Perform training for user or point of contact when present
- H. Setup LifeGuard Remote Web Monitoring per specification
- I. Test all modes of operation: Normal Mode, Emergency Mode, and Charging Mode

### 5.2 Site Requirements

The following Site Requirements are imperative to proper system installation.

#### 5.2.1 Battery Chemistry

The inverter shall be supplied with Valve Regulated Lead Acid (VRLA) batteries standard. These VRLA Batteries shall use Absorbent Glass Material (AGM) as the separator and utilize Recombinant Technology, which helps minimize gas emissions. The electrolyte used in the VRLA batteries shall not exceed 50 gallons in total, which is compliant with current IFC/UFC codes.

#### 5.2.2 Ventilation

As previously stated in section "2.6.2 Convection Cooling", each inverter shall be cooled by natural convection. For VRLA battery systems, the ventilation requirements for human occupancy and electronic equipment will meet or exceed the requirements for the batteries. No additional HVAC engineering shall be necessary for VRLA battery ventilation. The choice of mounting location should be made based upon the location being clean and dust free. Do not choose a location where particulate matter is present from industrial processes or manufacturing.

#### 5.2.3 Clearance

Clearance requirements follow compliance to NEC Section 110-26 requirements of 3 feet of open space in front of the inverter.

### 5.2.4 Floor Preparation

Mounting holes shall be provided in the base of each inverter cabinet. Each hole will accommodate 3/8" mounting hardware. It is recommended that all four holes are used when securing this unit. The floor shall support the dimensions and weight listed in "Section 8.0 Dimensions and Weights".

## 5.3 Best Practices

The following suggestions are recommended by the manufacturer based upon the substantial base of installed products throughout the world.

### 5.3.1 Inspection

Upon receipt of the inverter from the freight shipping company, inspect all cabinets and/or boxes for damage or potential impact. Should any damage be present, take pictures and fully document the occurrence. Any damage should be notated on the shipping carrier's *Bill of Lading*. This information should then be communicated to your local inverter representative.

### 5.3.2 Cabinet Modification

At no time, should any inverter cabinet be modified. This includes drilling and cutting into the cabinet. Drilling or cutting the cabinet will cause metal shavings to be present which could ultimately fall onto electrical components causing a short in the unit. If you believe modification of the cabinet is necessary, please contact Inverter Tech Support to discuss.

## 6.0 Breaker Configuration

The standard output configuration on all inverters shall be Normally On. Breakers can be added to any output type. Breakers shall be a UL 489 type approved for field wiring and maintain a 65KAIC rating.

(See ordering guide for available breaker and trip alarm configurations)

### 6.1 Normally On Output

Shall be energized 24/7 in all modes.

### 6.2 Normally Off Output

Shall only be energized in Emergency Operation Mode.

### 6.3 Switched Output

Shall be energized/de-energized with a switched command signal. In Emergency Operation Mode the load shall be energized regardless of the switch command signal.

### 6.4 Trip Alarm

This is an additional option for all circuit breaker load types. When tripped, the inverter shall set off audible and visible alarms.

## 7.0 Options

### 7.1 Trip Alarm (option code - TA)

When Trip Alarm Breakers are purchased, the inverter shall monitor each of those outputs for tripping. If any of the breakers trips, the unit will broadcast an alarm.

### 7.2 Terminal Block (option code - TB)

1 Summary / 2 Programmable terminal blocks. Allows inverter operations to be output to a BMS System via a Form C dry contact closure. The programmable terminal block can be field or factory configured for the following:

- A. AC Present
- B. Battery Charging
- C. High Temperature Alarm
- D. Utility Failure Alarm
- E. Near Low Battery Alarm
- F. Low Battery Alarm
- G. High VAC Alarm
- H. Low VAC Alarm

### 7.3 Internal Maintenance Bypass Switch (option code - MB)

This internal switch shall bypass all inverter operations when activated. Upon activation, the input power is directly connected to output breakers, allowing the inverter to be safely serviced.

### 7.4 Delayed Transfer (option code - DT)

This slows down the Fast Transfer time of 2mS to a standard transfer time of 50mS

### 7.5 Seismic Certified (option code - Z4)

The inverters are seismic certified with OSHPD Preapproval of Manufacturer's Certification (OPM) when the Seismic Zone 4 (Z4) option is included. Inverters were shake table tested to ICC-ES AC 156 code and Seismic Certified. All inverters are compliant to International Building Code (IBC) / California Building Code (CBC) 2016.

### 7.6 Remote Annunciator (option code - RA)

The Remote Annunciator (RA) option is available on all Modular Inverters. This remote panel can be located near the end-user monitoring the system, should the inverter be located in an inconvenient area or an area not easily accessible

### 7.7 Keyed Lock (option code - KE)

This option shall add a lock and key to the cabinet to prevent unauthorized entry.

**7.8 Maintenance Plan (option code - M(n); (n)=years)**

Once per year the manufacturer's technician shall visit the site to perform maintenance and software upgrades as needed. Maintenance shall include battery voltage checks, torque setting verification, cleaning, and a thorough visual inspection. All electronics warranties shall be extended to the duration of the Maintenance Plan. Maintenance Plans can be purchased for a duration of 1 year to 5 years.

**7.9 Extended Warranty (option code - EW)**

Extended Warranty can be purchased if the Factory Startup (FS) option has been purchased with the unit. The extended warranty period shall be for 5 years. For more information please see "Section 9.0 Warranty".

**7.10 Factory Startup (option code - FS)**

Factory Startup shall include a visit from a factory certified technician for inverter activation and demonstration. This option automatically extends the factory warranty from 2 years to 3 years.

**7.11 Wall Mount (option code - WM)**

A wall-mount option is available for the 1kW unit only.

**7.12 Extended Battery Life (option code - EB)**

This option shall extend the battery warranty to be 1 year full coverage without charge and 19 additional years of Pro-Rata coverage.

**7.13 Emergency Power Off Switch (option code - EO)**

This option includes an externally mounted Emergency Power Off (EPO) switch and provisions for connecting through an internal terminal block. The EPO option allows complete shut-down of all Inverter operation and is intended to be used in conjunction with Fire Safety and NFPA requirements.

**8.0 Dimensions/Weights**

Phase	Power Rating (kW)	Model #	# of Cabinets	Width (in.)	Height (in.)	Depth (in.)	Inverter Cabinet Weight (lbs.)	Battery Cabinet Weight (lbs.)	Shipping Weight
Single-Phase (1P)	1	LM1000	1	24	38	13	308	N/A	343
	1.6	LM1600	1	32	52	13.75	514		549
	2.2	LM2200	1	32	52	13.75	592		627
	2.8	LM2800	1	32	52	13.75	670		705
	3.2	LM3200	1	32	52	13.75	748		783
	4.2	LM4200	1	32	50	23	990		1060
	5.2	LM5200	1	32	50	23	1150		1220
	6.25	LM6250	1	32	50	23	1310		1380
	8.25	LM8250	2	32	50	23	400	1620	2020
	10.5	LM10500	2	32	50	23	400	1940	2340
	12.5	LM12500	2	32	50	23	400	2260	2660

**9.0 Warranty**

**9.1 Electronics Warranty**

Refer to standard *Central Power Systems Warranty* policy, which is available for download on the manufacturer’s website. All information within the Central Power Systems Warranty supersedes this document.

**9.1.1 Standard Manufacturer Warranty**

The standard manufacturer’s electronics warranty shall be for a period of 2 full years.

**9.1.2 Enhanced Manufacturer Warranty**

The enhanced manufacturer’s electronics warranty shall be for a period of 3 full years, if optional Startup Commissioning (FS) is included.

**9.1.3 Extended Manufacturer Warranty**

The extended manufacturer’s electronics warranty shall be for a period of 5 full years, if options Extended Warranty (EW) and Startup Commissioning (FS) are included.



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## 9.2 Battery Warranty

Refer to standard *Central Power Systems Warranty* policy, which is available for download on the manufacturer's website. All information within the Central Power Systems Warranty supersedes this document.

### 9.2.1 VRLA Batteries

The manufacturer's warranty on VRLA batteries follows the following warranty schedule:  
Repair or Replacement without charge – 1 year  
Pro-Rated Charge Repair or Replacement – 9 years

### 9.2.2 Pure Lead Batteries

The manufacturer's warranty on Pure Lead batteries follows the following warranty schedule:  
Repair or Replacement without charge – 3 years  
Pro-Rated Charge Repair or Replacement – 10 years

### 9.2.3 Extended Battery Life Option

The Extended Battery Life option shall extend the battery warranty to be the following:  
Repair or Replacement without charge – 1 year  
Pro-Rated Charge Repair or Replacement – 19 years

## 10.0 Support & Resources

Initial point of contact: Please contact your local inverter representative

Manufacturer Support: Evenlite Technical Support 1-800-526-5088

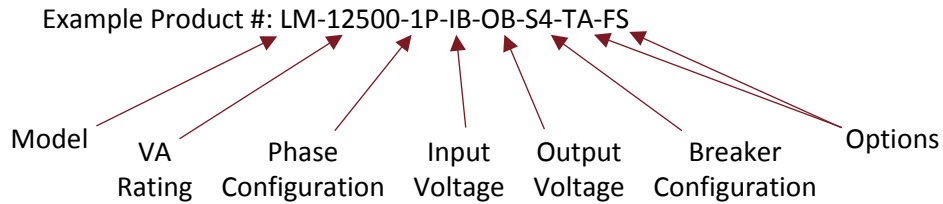
[quotes@evenlite.com](mailto:quotes@evenlite.com)

<https://www.evenlite.com/central-inverter-systems/>

**\*NOTE:** Phone Assisted Startup is available from the manufacturer. Contact technical support to schedule a representative for phone startup.



**11.0 Ordering Instructions (Part Number)**



Model	VA Rating	Phase Config	Input Voltage	Output Voltage	Output Breaker Configuration	Options																			
<b>LM</b>	<b>1000</b>	<b>1P</b> Single Phase	<b>IA</b> 120V (L-N)	<b>OA</b> 120V (L-N)	<b>C(n)</b> - 20A Normally On	<b>TA</b> Trip Alarm for all circuit breakers																			
	<b>1600</b>				<b>O(n)</b> - 20A Normally Off																				
	<b>2200</b>				<b>S(n)</b> - 20A Switched Output																				
	<b>3200</b>				<b>(n)</b> - Quantity Required																				
	<b>4200</b>				<b>IB</b> 277V (L-N)		<b>OB</b> 277V (L-N)	<b>BB</b> - Indicates Special Breaker Current Requirement (Contact Factory)	<b>TB</b> 1 Summary / 2 Programmable terminal block for form C dry contacts																
	<b>5200</b>																								
	<b>6250</b>																								
	<b>8250</b>																								
	<b>10500</b>									<b>IC</b> 208V (L-L)	<b>ID</b> 480V (L-L)	<u>1000VA</u> 8x20A Normally On w/o TA 5x20A Normally On w/ TA 4x20A Normally Off 4x20A Switched	<b>MB</b> Internal Maintenance Bypass Switch												
	<b>12500</b>																								
														<u>16000 - 3200VA</u> 11x20A Normally On w/o TA 7x20A Normally On w/ TA 6x20A Normally Off 6x20A Switched	<b>DT</b> Delayed Transfer, 60ms										
																<u>4200 - 6250VA</u> 12x20A Normally On w/o TA 8x20A Normally On w/ TA 6x20A Normally Off 6x20A Switched	<b>Z4</b> Seismic Zone 4 Certified (includes KE)								
																		<u>8250 - 12500VA</u> 24x20A Normally On w/o TA 16x20A Normally On w/ TA 12x20A Normally Off 12x20A Switched	<b>RA</b> Remote Annunciator						
																				<b>KE</b> Keypad Lock (Keyed Enclosure)					
																					<b>M(n)</b> Maintenance Plan (n)=years [Max 5 years]				
																						<b>FS</b> Factory Startup (Onsite Commissioning)			
																							<b>EW</b> Extended Warranty to 5 years (EW requires FS option)		
																								<b>WM</b> Wall Mount Kit (1KW only)	
																									<b>EO</b> Emergency Power Off



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